

Sweet cherry

harvest

trials

What has been done

The USDA and Michigan State University have been conducting cooperative studies of mechanical harvesting for the past five years, and the USDA and the University of California have initiated additional sweet cherry harvesting trials under California conditions this season.

The Michigan studies were begun in 1956. In that year a variety of hand and pole shaking methods were tried. These included the hand shaking of branches of various sizes, the use of hand-held pole shakers, and short lengths of rubber hose used to separate the fruit from the tree by striking the branches.

During the 1957 season several types of mechanical shakers, activated by compressed air, were tried but none proved satisfactory. It was in this year that spray chemicals were first applied for the purpose of loosening the cherries and increasing recovery (the amount of fruit that can be "separated" from the tree by shaking).

In 1958 the boom type shaker¹ (1½" stroke, 700 to 1,000 cycles per minute) and the fruit collecting equipment used in the tart cherry harvesting experiments were also used in harvesting sweet cherries.

The harvesting machines used experimentally during the 1959 and 1960 seasons were again tried on sweet as well as tart cherries. In these years a tree shaker² of new design and several improved types of fruit collecting units were studied.

The equipment was used in harvesting sweet cherries of the Napoleon, Schmidt and Windsor varieties. Fruit recovery, quality and labor-cost data were obtained.

Table I shows how the chemical looseners affected fruit recovery. As already mentioned, approximately 40 percent of the sweet cherries are made into mara-

THE nation now grows, on the average, almost 100,000 tons of sweet cherries annually, and production is increasing rapidly. In most years the farm value of this fruit exceeds \$25 million. Approximately 40 percent of the crop is sold as fresh fruit, another 40 percent is made into maraschino cherries, and the remaining 20 percent is canned or frozen.

Many of the country's sweet cherry growers are interested in mechanizing their harvest operation. They know that methods and equipment have been developed which make it possible to mechanize the harvest of tart cherries and

they hope that the same or similar techniques can be used to advantage in harvesting "sweets."

Sweet cherry harvesting costs are already high (growers pay more than \$6 million annually to the workers who harvest their fruit) and picking costs are likely to go even higher. The recruitment of harvest labor is already difficult, and recent developments indicate the problem is likely to become more acute.

The purpose of this article is to let growers know that sweet cherry harvesting studies are being conducted, and to report the progress that has been made.

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Table 1.
Sweet
Cherries
Separated
by Mechanical
Tree Shakers¹

Variety	Picked (before full color developed) for the Maraschino outlet.		Picked (when fully mature) for canning.	
	No chemical loosener Percent	Best chemical loosener Percent	No chemical loosener Percent	Best chemical loosener Percent
Napoleon	53	59	—	—
Windsor	62	82	—	—
Schmidt	—	—	81	90

¹Figures based on three years' work with chemical looseners.

schinos. Inasmuch as the fruit that goes to this market must be picked before it has developed deep red color, the cherries are harvested several days before they reach full maturity. At this stage they are still firmly attached to the tree, and it is difficult to separate them. Shaking approximately seven days before full maturity separated only 53 percent of the untreated Napoleons and 62 percent of the untreated Windsors. The results of this work led to the conclusion that unless an effective chemical loosener could be found, which would make it easier to separate the fruit, the tree shakers now being used could not be employed to advantage in harvesting sweet cherries at the stage of maturity that maraschino packers demand.

During the past four seasons, 15 spray chemical compounds (many of them at three different concentrations) were used

in an effort to discover a practical loosener. When the most effective chemical was used on the Napoleon variety, recovery was increased to 59 percent as compared to 53 percent for untreated cherries.

When applied to Windsors, the material increased recovery from 62 percent (when the fruit was untreated) to 82 percent. These figures represent averages; in some instances the results were considerably better. In 1959, for example, under the conditions which existed in one of the experimental blocks, the loosener increased the recovery of Windsor cherries from 65 percent (untreated) to 91 percent.

Cherries that are picked for canning are usually allowed to reach full maturity before being harvested. At this stage, separation is easier and the percentage of recovery of the untreated Schmidts

¹Manufactured by Gould Bros., Inc., San Jose, Calif.

²Distributed by Mapleton Garage, Inc., Traverse City, Michigan.



One of the tractor-mounted boom type shakers and fruit collecting frames which were used experimentally in harvesting sweet cherries in Michigan.

the size and shape of the trees, size of the crop, planting distances, terrain and other factors. The Michigan trials indicate that when machines are used the labor costs are from $\frac{1}{2}$ to 1 cent per pound.

On the basis of these figures alone it would seem that mechanization would save money. It should be remembered, however, that until a more effective loosener and/or more efficient equipment is developed, at least some, and possibly all, of the savings in labor costs may be offset by lower recovery and deficiencies in grade.

Discussion of results

The results obtained so far show that mechanization of the sweet cherry harvest reduces labor costs. The machines, however, do not separate all of the fruit, and the cherries that are left on the tree cannot, of course, be sold. It is also true that this fruit may increase the difficulty of controlling brown rot. The machines used in the trials tended to lower fruit quality, and further studies of this factor will have to be made before definite conclusions can be drawn.

Whether or not it will be practical for sweet cherry growers to use machines depends on the availability of harvest labor, the price obtained for the fruit, the cost of the necessary equipment, and other variables.

Many producers grow both tart and sweet cherries. While most of these men might (under present conditions) hesitate to purchase equipment for the sole purpose of harvesting tart cherries, they might feel that they were justified in providing themselves with machines that could be used for harvesting both varieties.

A chemical loosener which will make it possible to recover 90 percent or more of the fruit will probably make it feasible for many sweet cherry growers to use machines. Plans are being made to conduct extensive trials with the most promising chemical³ so far tested. It is hoped that this work will provide a satisfactory answer to the recovery problem in mechanical harvesting.

More effective equipment and better techniques are being developed, and these advances are sure to increase the efficiency of mechanized picking. Although the time has not arrived, it seems likely that the day will come when sweet as well as tart cherries will be picked with machines.

brought about by shaking was 81. When the most effective chemical loosener was used, recovery increased to 90 percent.

Although there has been considerable variation in the results so far achieved with chemical looseners, one material (as already stated) has been found that does increase recovery. A still better chemical, or a more effective concentration of the one now being tested, would remove one of the most serious obstacles which now stand in the way of mechanizing the harvest of sweet cherries.

Quality of fruit

Quality data was obtained in 1960 both at harvest time and after brining or canning. Stems were taken into account because they are one of the factors considered in establishing grades. The results so far achieved show that when sweet cherries were machine harvested for the maraschino market, from 42 to 61 percent of the fruit came off the tree with stems attached. When Schmidt cherries were machine harvested for canning, at full maturity, 17 percent of them came off with stems attached.

While the percentage of stems is relatively high, most processors do not seem to feel that stems present a particularly serious problem. Mechanical destemmers are available to packers who want stems removed. A machine could probably be developed that would separate cherries with stems from those without stems. Separating the two classes of fruit would make it possible for packers who cared to do so to put up a "regular pack"

(cherries without stems) and a "cocktail pack" (cherries with stems).

The equipment used in 1959 and 1960 caused some bruising. In the case of the Napoleon variety, the bruises tended to bleach out during the brining process, so they were not considered particularly objectionable.

Machine harvested Windsors also showed some evidence of bruising, but in this case the appearance of the fruit did not improve during the brining process. Machine picked cherries of this variety graded out 85 percent U.S. No. 1 as compared to 95 percent U.S. No. 1 when the fruit was hand picked.

In the case of the Schmidt variety, which is harvested for canning when fully mature, mechanization caused bruising. However, hand picking also causes bruising and the after-canning grade of machine picked fruit equaled that of the hand picked cherries.

Additional work will have to be done on the question of how quality is affected by mechanization before definite conclusions can be drawn.

Harvesting costs

In Michigan, where sweet cherries are almost always picked by hand without stems, the workers are usually paid piece-work rates of $2\frac{1}{2}$ to 3 cents per pound. On the West Coast, where sweet cherries are commonly picked with stems, the piece-work rates are considerably higher.

The rate at which sweet cherries can be harvested with machines depends on

³An experimental compound developed by the Upjohn Co., Kalamazoo, Mich.